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AGRICULTURAL
DIVERSIFICATION
AND
ECONOMIC
DEVELOPMENT
IN

Thailand

A Case Study

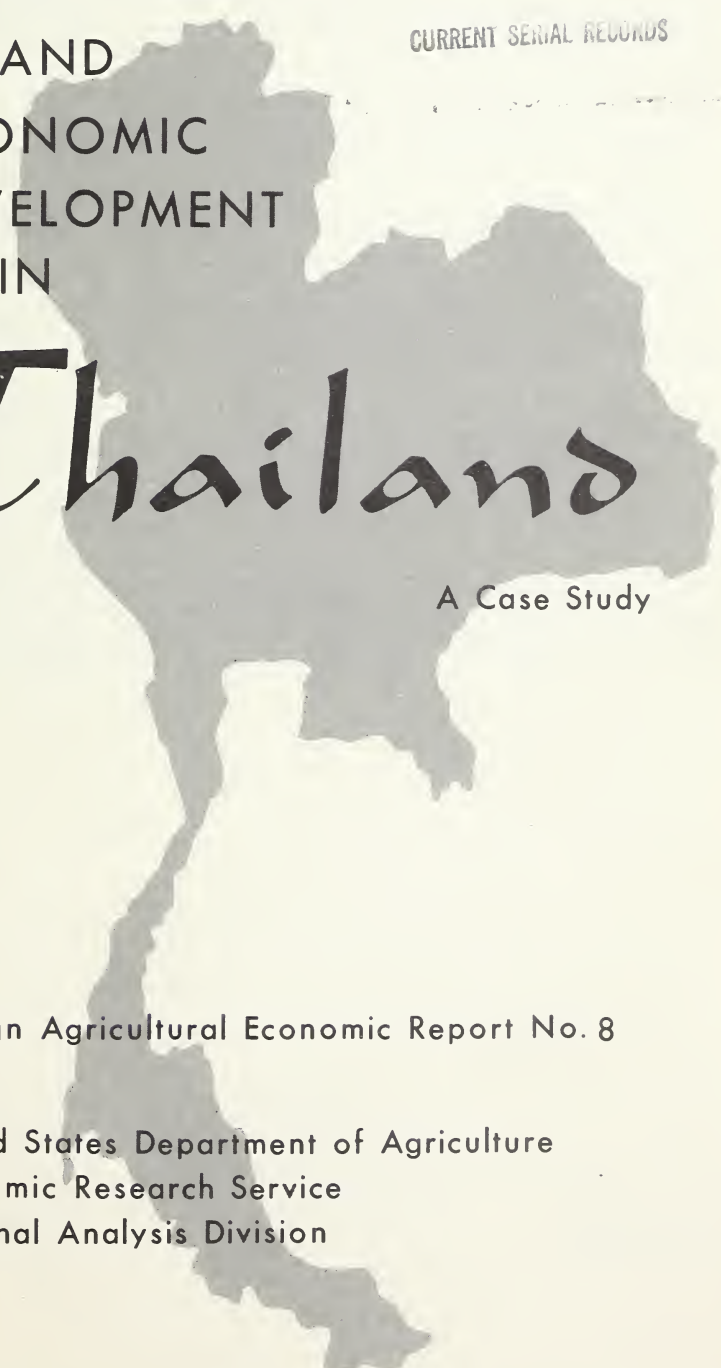
Foreign Agricultural Economic Report No. 8

United States Department of Agriculture
Economic Research Service
Regional Analysis Division

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PREFACE

The relationship between agricultural diversification and economic development has often been discussed in recent years. Scarcely a multiyear development plan has been formulated in which diversification has not been a stated objective. Few attempts, however, have been made to examine empirically any particular cases. This study examines in detail the agricultural economy of Thailand which has diversified both its production and export patterns. A variety of methods of measuring diversification is employed to gain as much perspective as possible. An attempt is also made to examine the implications of agricultural diversification for the Thai economy, particularly its direction and rate of development.

During the period under survey in this study, Thailand has received economic and technical assistance from external sources. Much of this aid, particularly in agriculture, has come from the United States. The exact role of U.S. aid in the impressive achievements in Thai agriculture cannot be measured. It is, however, evident that U.S. efforts to develop the progressive, viable agriculture so essential to long-term economic growth are beginning to bear fruit.

It is hoped that the material in this study will be of use to policy makers. Every underdeveloped economy is an agrarian economy and decisions made regarding agriculture will shape the future rate of progress of the entire economy. The problems faced by any underdeveloped economy are in large measure the same as those faced by Thailand.

This study was initially submitted in May 1962 as a term paper in a Harvard University economics seminar, Problems of Political and Economic Development. The author is grateful to Dr. Richard Mallon of Harvard, Dr. Quentin West, and Dr. Riley Kirby, of the Far East Analysis Branch, for their useful comments.

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SUMMARY

While other less developed countries in Asia have been busily formulating multiyear development plans, Thailand has proceeded without one, and it was only in late 1961 that a 6-year plan was adopted. Despite the lack of plans, farm income, at constant prices, climbed 60 percent during the past 6 years. Total exports, almost entirely agricultural, have risen at a comparable rate.

Thailand has traditionally been a rice monoculture. During the past decade, however, rice output expanded only 14 percent or just over 1 percent annually. Output of all other crops increased 180 percent or an average rate of 18 percent per year. Leading the rapid growth in output of other crops were three export commodities--corn, cassava, and kenaf.

As Thai farmers discovered that they could produce corn at competitive prices they successfully exploited this advantage in the growing Japanese feed grain market. Farmers also responded quickly to the strong U.S. demand for tapioca flour by increasing cassava output some eightfold over the past 5 years. The reaction to favorable prices for kenaf, a soft fiber used in the manufacture of burlap, has been even more impressive, for tonnage of this crop expanded some sevenfold from 1958 to 1961.

Thailand's exports, almost entirely agricultural, averaged only \$325 million per year from 1952 to 1958, but as agricultural diversification accelerated in 1958 exports climbed sharply. By 1961 they had reached \$475 million, an increase of nearly 50 percent. With the rapid expansion of agricultural exports over the past few years, Thailand has now emerged as the leading exporter of agricultural foodstuffs in Asia. Perennially a leading rice exporter, it has now surpassed both Rumania and Yugoslavia in corn exports, and in 1961 ranked fourth behind the United States, Argentina, and the Union of South Africa. The Thais have strengthened their position as the third ranking world supplier of rubber and as a leading source of both kenaf and tapioca flour in the world market.

To achieve this rapid expansion and diversification of farm output more inputs have been required. Both additions to the stock of resources and more intensive use of existing resources have been involved. There is no evidence to indicate that resources have been withdrawn from the production of traditional crops, such as rice, to produce the new crops.

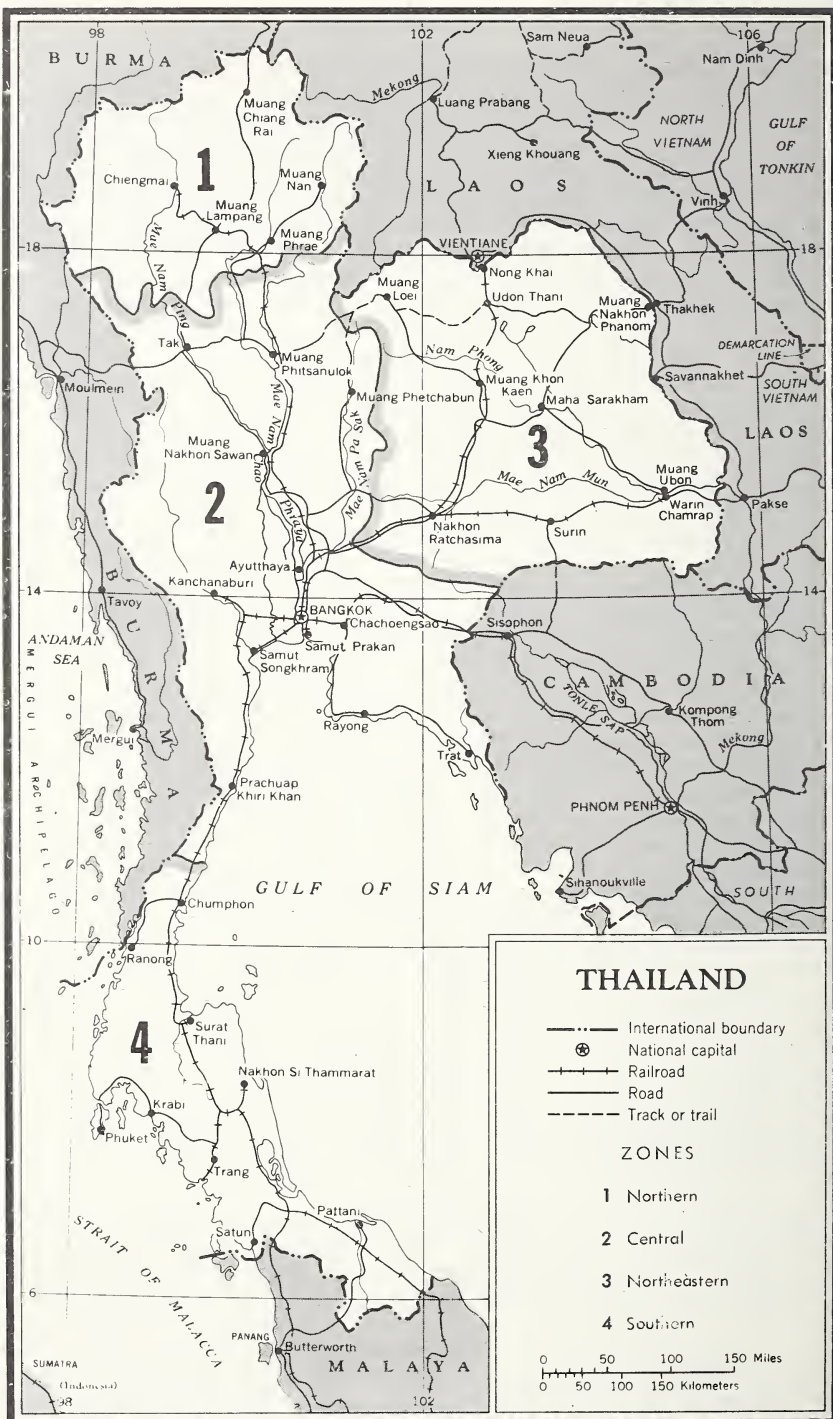
The additional labor required to reach the higher output levels in recent years seems to trace more to a reduction in seasonal unemployment than to an actual increase in the size of the farm labor force. Most of the increase in planted area has been made possible through bringing new land under cultivation although a minor, but significant, share has resulted from increased multiple cropping.

Data on capital inputs are incomplete but it is not likely that these inputs have expanded significantly more than planted area and man-hour inputs. Because output has risen much more than any of the factor inputs, it appears that a positive interaction of factors has been involved.

Government policy designed to encourage diversification, extension of transport facilities to the more remote regions of the country, and expansion of the area under irrigation have contributed much to rapid diversification. Also contributing to the more

diversified output have been the gradual decline in rice prices during the past decade and the ability of farmers to respond to favorable prices of other commodities in the world market.

The stimulus for diversification has come largely from the external market and it has affected the great bulk of the small-scale owner-operators who comprise the agricultural sector of the Thai economy. Thai farmers are beginning to respond to favorable prices and are producing for the market as well as for their own needs. This encouraging development, plus generally favorable agricultural resources, speaks well for Thailand's economic future.



AGRICULTURAL DIVERSIFICATION AND ECONOMIC DEVELOPMENT IN THAILAND: A CASE STUDY

By Lester R. Brown, International Agricultural Economist
Regional Analysis Division, Economic Research Service

GENERAL CHARACTERISTICS OF THAI AGRICULTURE

Physical Setting

Thailand, situated between 5° and 20° north, lies entirely within the tropics and like the remainder of monsoon Asia, it is warm and moist, and well adapted to rice cultivation. The rainy or monsoon season which arrives in May and continues through September or October results in an annual rainfall of over 75 inches for most of the country. Temperatures are persistently high for the duration of the summer monsoon, with the central plain having a mean temperature for this period of 98° F. During the 6-month dry season following the monsoon very little land is cultivated other than that under irrigation.

The highlands, which rim Thailand and form natural boundaries with adjacent countries, create a vast watershed which drains into the flat central plain and the centrally situated Chao Phraya River System. The sluggish and shallow nature of the Chao Phraya causes it to overflow during the monsoon, annually inundating some 5,000 square miles of its floodplain.

Thailand's central plain consists of fine sandy and silt loams superimposed upon a variety of heavy and relatively impervious clays. River banks usually consist of light sandy soils on which fruit and vegetables are grown. The Khorat Plateau, in the Northeast, consists largely of low-fertility sandy soils covered with a sparse natural grass vegetation; it supports most of Thailand's small but rapidly expanding commercial livestock industry. The river valleys in the Northeastern region, containing dark clay soils overlaid with alluvial deposits, are intensively cultivated with much double cropping of rice with rice or in combination with other crops such as soybeans or peanuts. Deep red soils on the southeastern coastal plain produce rubber, sugarcane, and fruit. On the infertile sandy loam and clay loam soils of the extreme southern peninsula, rubber is grown extensively.

Rural Population

An estimated 80-85 percent of the Thai population is agricultural. Possibly 70 percent of the total population cultivate rice. These cultivators may produce subsidiary crops or be occasionally employed elsewhere, but their principal activity is the cultivation of rice.

For centuries, Thailand's population has grown very slowly but with the recent reduction in the death rate, the rate of natural increase has risen from less than 1 percent to an estimated 2-3

percent per year. In 1960, Thailand's population numbered 26 million, 75 percent of which is of Thai stock. Several minority groups--Chinese, Indonesian, Cambodian, Laotian, and Vietnamese--make up the remainder but the Chinese, numbering 3.5 million, are easily the dominant minority group. Although the Chinese represent only one-seventh of the population, they play a key role as middlemen in the economic life of the country.

Only a little over half of the rural population is literate but the literacy level is rising rapidly as the facilities for, and means of implementing, universal compulsory education become available. Political power has traditionally resided in the hands of the small upper class but this concentration is gradually diminishing as the middle class expands.

Economic Characteristics

The Thai economy has been historically a one-crop economy--a monoculture in the true sense of the word. It has also been a traditional, subsistence-oriented, agricultural economy; two-thirds of the 70 percent who gain at least part of their livelihood from rice farming market part of the rice they produce.

Historically, the Thais had a closed economy characterized by subsistence cultivation until 1855 when a trade agreement with Great Britain initiated the rice export trade. From 1855 until 1950 rice usually accounted for 60 to 70 percent of all exports. At the turn of the century about half the crop was being exported.¹ In recent years exports have usually accounted for 25-30 percent of output. Clearly, world rice prices strongly influenced the level of economic activity and the well-being of the people. Nearly all rice production is in the hands of the Thais, but the milling and trading operations are largely handled by the Chinese.

Agriculture in Thailand is rather extensive; land is relatively abundant, multiple cropping is not frequently practiced, and capital inputs in the form of fertilizer and machinery are rather limited. Annual per acre applications of fertilizer, amounting to less than one pound per acre, are lower than in any other Far Eastern country except Burma and Pakistan.

Land Tenure

Land reform has not been necessary in Thailand; large holdings are quite rare, since by custom each freeman was entitled to as much as he and his family could cultivate, and the amount seldom exceeded 10 acres. In 1950, census figures indicated that 85 percent of the farmers were owner operators (some part owners and part tenants).² The 85 percent accounted for some 90 percent of the cultivated area.³ Rent has traditionally been paid in kind but as commercialized farming develops, cash payment is becoming more common.

¹ Ingram, J. C. *Economic Change in Thailand Since 1850*. Stanford Univ. Press, Stanford, Calif., p. 37, 1955.

² Jacoby, E. H. *Agrarian Unrest in Southeast Asia*. Asia Publishing House, N. Y., 1961.

³ See footnote 2.

THE NATURE AND EXTENT OF AGRICULTURAL DIVERSIFICATION

There are three possible ways in which agricultural diversification may occur in any given economy. Output of the various commodities may expand at an uneven rate; some commodities may expand while all others contract; or an uneven rate of contraction may occur. Thailand, over the past decade, seems to fit into the first category, for the volume of production of all important commodities has been increasing, though at an uneven rate.

Shifting Pattern of Land Utilization

The planted area of each of the major crops expanded between 1950 and 1961 (table 1). Some crops--rice, mungbeans, soybeans, sesame, and cotton--made only modest percentage gains; an almost equal number--sugarcane, peanuts, coconuts, and tobacco--approximately doubled their planted areas; others, such as corn, cassava, and kenaf, made striking gains expanding some ten, twenty, or thirty fold.

Diversification of the agricultural sector might best be observed by studying the relative positions of the various crops in the production pattern. The relative importance of rice declined as its planted area dropped from just under 90 percent of the cultivated area to just over 75 percent. Each crop, other than rice, at least maintained its share of the planted area, and all but a few such as mungbeans, soybeans, and sesame expanded their share. Three export crops--corn, cassava, and kenaf--whose combined area amounted to less than 1 percent of the planted area in 1950, grew rapidly in importance in the late 1950's and by 1961 they accounted for more than 10 percent of the total area.

A comparison of crops ranked by acreage planted in 1950 and 1961 shows that only rice and tobacco maintained their respective positions throughout the period (table 2). Rubber dropped from second to third in 1961 as corn, a crop ranked eighth in 1950, moved up to second place. Only four crops moved upward in ranking while eight declined, indicating that the upward movements were generally much more pronounced.

Changing Production Pattern

During the 1950-61 period the rice share of the agricultural product dropped from 81 to 62 percent (tables 3 and 4). All other crops with the exception of peanuts increased their share of agricultural output--at the expense of rice. When the growth of rice output is compared with all other commodities the difference is striking. With 1950-52 as a base period, the rice output index had reached only 114 by 1961--gaining just over 1 percent annually--while the index for all other crops had reached 281 or an average annual growth of 18 percent (fig. 1).

Much of the decline in the relative share contributed by rice and the corresponding rise of other crops has taken place in the last 3 years. Some of the more spectacular increases in total output were made by corn; from 1.8 percent of total output in 1958

TABLE 1.--Thailand: Planted acreage of principal crops, 1950-61

Commodity	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres
Rice.....	13,677	14,712	13,253	15,237	13,719	14,244	14,871	12,537	14,200	14,967	15,095	14,657
Corn.....	86	102	111	118	130	137	203	239	313	493	928	1,173
Cassava.....	34	34	34	37	37	34	22	95	109	154	350	375
Sugarcane.....	133	173	182	204	237	255	300	317	325	365	365	340
Mung beans.....	100	80	80	72	78	85	86	94	100	114	116	118
Castor beans.....	11	32	31	26	37	36	47	65	57	69	71	71
Peanuts.....	174	178	178	179	195	198	202	240	246	246	320	320
Soybeans.....	48	53	59	54	55	53	58	65	56	54	59	61
Coconuts.....	198	231	235	254	294	303	327	336	334	334	334	336
Sesame.....	47	38	42	37	39	42	43	54	54	53	55	56
Kenaf.....	12	35	26	24	15	21	43	31	50	110	212	417
Cotton.....	90	101	95	100	86	81	100	103	102	119	105	132
Tobacco.....	76	104	108	133	134	139	140	152	151	153	146	146
Rubber.....	780	805	820	825	829	835	837	839	841	1,004	1,001	1,027
Total.....	15,466	16,678	15,254	17,300	15,885	16,463	17,279	15,167	16,938	18,235	19,157	19,229

Source: Agricultural Statistics of Thailand, Ministry of Agriculture, Bangkok, Thailand, 1960; 1961 data from Indices of Agricultural Production for the Far East and South Asia, Regional Analysis Div., Econ. Res. Serv., U.S. Dept. Agr., Nov. 1961.

TABLE 2.--Thailand: Planted acreage of each crop as percent of total acreage in principal crops, 1950 and 1961

Commodity	1950		1961	
	<u>Percent</u>	<u>Rank</u>	<u>Percent</u>	<u>Rank</u>
Rice.....	88.4	1	76.3	1
Corn.....	.6	8	6.1	2
Cassava.....	.2	12	1.9	5
Sugarcane.....	.9	5	1.8	6
Mung beans.....	.6	6	.6	11
Castor beans.....	.1	13	.4	12
Peanuts.....	1.1	4	1.7	8
Soybeans.....	.3	10	.3	13
Coconuts.....	1.3	3	1.7	7
Sesame.....	.3	11	.3	14
Kenaf.....	.1	14	2.2	4
Cotton.....	.6	7	.7	10
Tobacco.....	.5	9	.7	9
Rubber.....	5.0	2	5.3	3
Total.....	100.0		100.0	

Source: Derived from table 1.

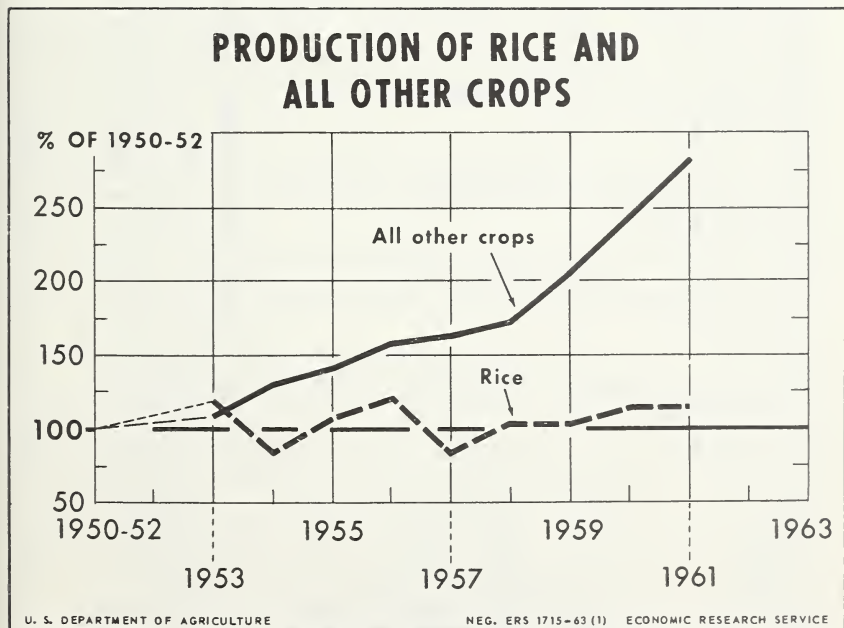


Figure 1

TABLE 3.--Thailand: Production of principal agricultural commodities, 1950-61

Commodity	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
	1,000 metric tons	1,000 metric tons	1,000 metric tons	1,000 metric tons	1,000 metric tons	1,000 metric tons	1,000 metric tons	1,000 metric tons	1,000 metric tons	1,000 metric tons	1,000 metric tons	1,000 metric tons
Rice (paddy).....	6,782	7,325	6,602	8,239	5,709	7,334	8,297	5,738	7,050	7,055	7,790	7,900
Corn.....	27	42	45	51	62	68	115	110	185	317	600	800
Cassava ¹	215	215	215	235	235	215	185	425	650	660	1,083	1,544
Sugarcane ²	839	1,291	1,476	1,820	2,437	2,699	3,830	4,147	4,309	4,988	4,990	4,500
Mung beans ³	32	26	24	26	28	34	37	41	42	46	50	52
Peanut beans.....	3	12	10	9	16	15	24	25	29	36	37	37
Castors, shelled...	63	76	76	78	92	94	101	66	72	73	90	90
Soybeans.....	12	21	21	20	21	20	22	22	22	21	25	26
Copra.....	105	122	126	152	207	224	239	267	209	227	210	230
Sesame.....	9	7	9	9	10	11	13	13	17	19	18	18
Cottonseed ⁴	14	18	16	17	15	17	22	23	24	24	25	32
Kenaf.....	5	20	13	14	8	10	17	21	30	50	99	200
Cotton ⁴	6	8	8	8	8	9	11	11	11	12	12	15
Tobacco ⁵	9	16	17	20	21	23	24	26	27	27	28	28
Rubber.....	114	111	100	98	120	133	137	135	140	173	183	184

¹ Data for 1957-61 from Agricultural Situation Report, U.S. Agricultural Attache, American Embassy, Bangkok, Thailand, Sept. 29, 1961.

² Data for 1950-59 from Agricultural Statistics of Thailand, Ministry of Agriculture, Bangkok, 1961; data for 1960-61 from Agricultural Situation Report.

³ Data for 1950-58 from Agricultural Statistics of Thailand, 1961; data for 1959-61 from Agricultural Situation Report.

⁴ Data for 1950-56 gives cotton and cottonseed production combined. The total is divided according to ratio known to exist in 1957-61.

⁵ Wet leaf figure 1950-57 converted to dried at 40 percent (based on 2 overlapping years).

Source: Data for 1950-56 from Agricultural Statistics of Thailand, 1960; data for 1957-61 from Indices of Agricultural Production for the Far East and South Asia, Regional Analysis Div., Econ. Res. Serv., U.S. Dept. Agr., Nov. 1961.

TABLE 4.--Thailand: Share of each commodity in agricultural output at constant prices, 1950-61¹

Commodity	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Rice.....	81.0	80.1	79.0	81.5	71.8	75.1	75.3	67.1	70.2	66.6	65.0	62.0
Corn.....	.3	.5	.5	.5	.4	.7	1.0	1.3	1.8	3.0	5.0	6.3
Cassava.....	.9	.8	.9	.8	1.0	.8	.6	1.7	2.3	2.2	3.2	4.2
Sugarcane.....	1.0	1.4	1.8	1.8	3.1	2.8	3.5	4.9	4.3	4.7	4.2	3.5
Mung beans.....	.5	.4	.4	.3	.5	.5	.5	.6	.6	.6	.6	.5
Castor beans.....	.1	.2	.2	.1	.3	.2	.3	.4	.4	.5	.5	.4
Peanuts, shelled...	2.0	2.2	2.4	2.0	3.0	2.5	2.4	2.0	1.9	1.8	2.0	1.8
Soybeans.....	.1	.4	.5	.4	.5	.4	.4	.5	.4	.4	.4	.4
Copra.....	2.1	2.2	2.5	2.5	4.3	3.8	3.6	5.1	3.4	3.5	2.9	3.0
Sesame.....	.3	.2	.3	.3	.4	.4	.4	.5	.5	.6	.5	.4
Cottonseed.....	.3	.4	.4	.3	.4	.3	.4	.5	.5	.5	.4	.5
Kenaf.....	.1	.5	.4	.3	.3	.3	.4	.6	.7	1.2	2.1	3.9
Cotton.....	.4	.5	.6	.5	.6	.5	.6	.7	.6	.6	.6	.7
Tobacco.....	.9	1.5	1.7	1.7	2.3	2.0	1.9	2.6	2.3	2.2	2.0	1.9
Rubber.....	9.7	8.7	8.6	6.9	10.8	9.7	8.9	11.3	10.0	11.7	10.9	10.3
Total.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

¹ Minor agricultural commodities and livestock products omitted. Value of output calculated by applying price relatives, based on average regional commodity prices for 1952-54, to production data in table 3.

to 6.3 percent in 1961, cassava; from 2.3 to 4.2 percent; and kenaf from .7 to 3.9 percent.

The decline in the proportion of output contributed by rice has been due not to a decline in rice production but to the very rapid growth in output of other crops. If the recent average rate of expansion should continue for 2 more years, rice will be accounting for less than half of all agricultural output.

Rubber--An Expanding Role

Rubber was the first crop to make any substantial reduction in the traditional total dominance of rice. It was introduced following World War I and production expanded particularly fast during and immediately after World War II. The principal impact of rubber in regard to diversification occurred, however, before the 1950-61 period under survey.

The production of rubber is almost entirely in the hands of smallholders and, unlike other crops, a large part is produced by Chinese cultivators. In 1949, an estimated one-half of the rubber land was controlled by persons of Chinese ancestry, but there is some evidence that this proportion has declined.

It has been relatively easy for smallholders to become established in rubber production. A \$100 capital stake has often been sufficient to cover the direct capital outlays, such as a nominal land occupancy fee, land clearing tools and implements, and seedlings (which are often provided free by neighbors or at a subsidized rate by government). During the 6-year interim required to bring seedlings into production beginning farmers often work as tappers for farmers who own producing stands.

In contrast with many crops, rubber creates considerable employment for persons other than farmers. Some 50,000-60,000 workers are employed by producers as tappers and since nearly all output is exported, an additional number is employed in handling and processing the crude rubber for export.⁴

The government has actively encouraged rubber production by exempting producers from taxes, licenses, and export duties. It has also been providing direct technical assistance to growers. The unplanted land believed suitable for rubber production is estimated at 400,000 acres, thus leaving considerable room for expansion.

Corn--A Feedgrain for Export

Corn is a relatively new crop in Thailand, for prior to 1950 very little was grown. Since then output has expanded some 30 fold. Many areas in central and northeast Thailand have been undergoing a "corn boom" during the last few years. The reason seems simple--relatively good prices and a convenient market. Gross returns per acre of corn averaged 750 baht per acre as compared with 450 for rice.⁵ Data on net capital inputs are not

⁴ Human Relations Area Files, Thailand, Country Survey Series, HRAF Press, New Haven, p. 325, 1957.

⁵ Tulyayan, Niwat. The Thai Maize Industry. Bangkok Bank Monthly Review, p. 13, Dec. 1961.

available but, given the greater labor requirements of rice, they might indicate even more disparate rates of return on the two crops. Much of the corn is being planted on new land; it is a rain-fed crop and thus does not generally compete with rice for the irrigated land. The new land is relatively fertile and requires little fertilizer. Corn production has still another attraction in that it requires a comparatively short growing season of only 90-120 days, thus making double cropping either of corn with corn or with another crop much easier.

Cultural practices are not advanced, but they have improved as farmers gain experience in corn cultivation. Yields which started at 10 bushels per acre in 1950 reached 25 bushels per acre in 1961. They should continue to trend upward as improved seeds become available and more fertilizer is used.⁶ Some farmers are planting two crops of corn--the first planted in May and the second in September or October. Many farmers are also following the first corn crop with mungbeans, a leguminous soil building crop which is exported in sizable quantities.

Corn is not considered a foodgrain by most Thais and only limited quantities are used for domestic feed, mostly for poultry. It is expected, however, to play a growing role in the development of the domestic livestock industry, particularly if the export market for livestock products continues favorable. With only small quantities of corn consumed as food and used as feed, the rise in production has been largely in response to strong external demand. Middlemen or dealers usually bring portable shellers to the farm and buy and shell the corn on the spot. They then ship it to Bangkok by boat or truck, depending on the location and facilities available. The difference between on-farm corn prices and export prices is relatively small, indicating a rather efficient marketing and handling operation.

Some 80 percent of Thailand's corn exports goes to Japan where it is used as a feed grain to support the rapidly expanding Japanese livestock industry. Efficient production of corn in Thailand coupled with nearness to the Japanese market gives the Thai producers a strong competitive edge. Thai corn, consistently priced below that from other sources, averaged \$59.16 per metric ton in Japan during the first half of 1960 as compared with \$59.80 for U. S. corn, \$59.90 for corn from Argentina, and \$59.57 for that coming from the Union of South Africa.⁷ In 1960 nearly all Thai corn not going to Japan went to nearby destinations, such as Singapore, Hong Kong, North Borneo, and Malaya. By early 1962 sizable shipments were beginning to move to Western Europe.

Excess moisture has caused objections from Japanese buyers but cooperative Thai-Japanese efforts are being made to overcome this through better storage and drying facilities. Japan is likely to continue as an important outlet for Thai corn since this serves to correct the perennial imbalance of trade between the two countries. Trade with Japan, plus the development of other markets, augurs well for the future of corn production in Thailand.

⁶ Thailand Becomes Important Corn Producer and Exporter. Foreign Agricultural Circular FG1-61, U.S. Dept. Agr., Jan. 1961.

⁷ Hardin, L. S. and Hesser, L. F. The Effectiveness of Agricultural Market Development Projects in Japan. Res. Bul. No. 719, p. 36, Purdue Univ., May 1961.

Cassava--A Food Staple for Export

The production of cassava, an unimportant crop as late as 1956, has increased several fold reaching 1.5 million tons in 1961. Although cassava now occupies some 2-percent of the country's planted area, only a minor share of output is consumed domestically. In terms of planted area, it ranked fifth among all crops grown in 1961 as compared with twelfth in 1950. The current scale of production is largely a response to the strong demand in the U.S. and European markets for tapioca flour. In 1960 tapioca flour and meal exports were valued at 12.8 million dollars, or 3 percent of all foreign exchange earnings.

Cassava cultivation, concentrated in the Southeast, is largely in the hands of smallholders who usually grow it as a supplementary cash crop. Most farmers are reluctant to plant more than a minor part of their land to cassava because continuous cultivation rapidly depletes soil fertility; few farmers normally practice planned rotation of crops.

Although there are hundreds of tapioca flour mills along the southeast coast of the Gulf of Siam, three large modern mills account for a large part of the flour going into the export market. Most of the remaining mills are much smaller, and produce for local consumption. Some of the larger tapioca flour mills are now producing part of their supply of roots on company-owned land.

Kenaf--A Fiber in Demand

Gains made in the production of kenaf over the past few years have been impressive. From 1950 to 1958 production ranged around 20,000 metric tons but in 1959 it abruptly began to expand, increasing 10 fold by 1961. In 1950 kenaf ranked thirteenth among all crops in acreage planted but by 1961 it had risen to fourth place. This rapid increase is attributed largely to poor crops in other jute- and kenaf-producing countries, namely India and Pakistan; active government encouragement in the form of a minimum price guarantee; free distribution of seeds; and the development of processing and transport facilities.

A very favorable cost-price relationship has provided a strong incentive to produce. It is estimated that the cost of production (land, labor, seeds, and transport) averages about 500 baht per acre. If returns are calculated on the basis of the minimum price guaranteed by the government (they are invariably higher), the per acre return under average conditions amounts to 750 baht.⁸ This gives a minimum profit of 250 baht per acre--a very good return for a Thai farmer. The farm price is 2.36 baht per kilogram and the export price is 2.84 baht. Thus, the value added by the middleman, who must cut and grade the fiber as well as transport it from the warehouse to shipside, averages only 20 percent. Thai farmers seem to undercut easily their competitors in India and elsewhere.⁸ Even though the raw fiber is very efficiently produced in Thailand, gunny bags manufactured domestically are inefficiently produced and hence more expensive than those imported.

⁸ Tulyayan, Niwat. Thailand's Jute Industry. Far Eastern Economic Review, p. 20, Jan. 4, 1962.

Kenaf is used mostly for the manufacture of gunny bags, although small quantities are used for rope making and the paper industry. Gunny bag requirements amount to about 30 million bags in most years--of this, domestic mills supplied just under 6 million in 1960. In 1961 Thai farmers produced some 200,000 tons of kenaf, of which, about 40,000 tons were used to manufacture bags required for domestic use.⁹ The three domestic mills making gunny bags have a combined capacity of 10 million bags annually, but they seldom operate at full capacity. In 1960, a relatively good year, they produced less than 6 million bags. The 21 million bags imported in 1960 required foreign exchange expenditures of 121 million baht.¹⁰ Present government plans call for an expansion of the bag manufacturing industry to the extent that output will satisfy domestic demand by 1965, thus realizing substantial foreign exchange savings.

Sugar--An Import Substitute

Thailand has traditionally imported several thousand tons of centrifugal sugar to satisfy the gap between domestic production and consumption. Domestic output has risen steadily in recent years, with cane production expanding some fivefold from 1950 to 1961. In 1960 production exceeded demand and a surplus began to accumulate; stocks expanded further in 1961 and Thailand is now seeking markets in nearby sugar-deficit countries.¹¹

THE DIVERSIFICATION OF AGRICULTURAL EXPORTS

Nature and Extent of Export Diversification

Rice accounted for over 50 percent of all exports on the average during the 1950-55 period reaching a high of 66 percent in 1953. Its importance declined steadily in the late 1950's, however, and by 1960-61 rice represented only a third of all exports (tables 5 and 6). The share of exports accounted for by nonagricultural items hovered around 20 percent throughout the period under survey (table 7). Agricultural exports other than rice and rubber remained rather steady at around 5 to 10 percent from 1950 to 1957, but beginning in 1958 a series of marked successive expansions raised the share of this group to just under one-fourth of all exports by 1961 (fig. 2).

Three commodities--corn, cassava, and kenaf--have spurred the rise in the other agricultural category (fig. 3). Combined exports of these commodities amounted to 1 percent in 1950 but by 1961 their share had risen to 17 percent. Thailand's competitive capability for these three products in the world market appears strong, and it is likely that their share of total exports will continue to grow.

⁹ Tulyayan, Niwat. Jute and Kenaf Development in Thailand. Monthly Review--Bangkok Bank, Ltd, p. 13, Aug. 1961.

¹⁰ See footnote 9.

¹¹ Monthly Review--Bangkok Bank Ltd. The Sugar Industry, p. 11, Feb. 1961.

TABLE 5.--Thailand: Value of principal agricultural exports, 1950-61

Commodity	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
	Million baht	Million baht	Million baht	Million baht	Million baht	Million baht	Million baht	Million baht	Million baht	Million baht	Million baht	Million baht
Rice.....	1,674.8	1,825.5	2,632.6	3,751.6	3,292.3	3,215.5	2,879.6	3,639.0	2,989.3	2,603.9	2,596.2	3,638.7
Corn.....	10.5	21.3	27.9	47.0	56.1	80.0	96.1	74.4	182.7	249.5	550.7	597.0
Cassava flour....	24.9	12.6	18.2	36.3	58.5	52.9	94.6	127.2	177.4	193.6	270.4	427.2
Chili, dried.....	47.3	42.7	22.1	26.8	52.0	28.8	36.3	22.8	10.6	27.1	32.5	25.8
Mung beans.....	10.6	22.2	16.6	17.0	23.9	23.7	43.1	32.6	24.3	37.2	48.3	60.5
Peanuts.....	50.2	56.6	67.6	77.3	68.0	77.2	82.5	54.4	59.2	46.1	39.3	51.9
Castor beans.....	10.0	37.8	51.4	52.4	42.4	35.8	62.9	86.8	42.3	77.4	71.3	94.2
Fresh eggs.....	.2	.2	.3	.4	11.3	29.0	57.7	62.8	46.8	73.2	128.8	2 104.6
Bullocks and buffaloes.....	(³)	(³)	(³)	.7	22.3	44.2	70.0	57.7	59.7	87.3	99.8	119.0
Hides and skins ⁴ ..	31.6	26.6	(³)	21.1	30.8	54.0	37.3	41.2	39.2	64.0	73.9	73.1
Jute and kenaf....	1.3	4.3	2.9	7.6	11.9	8.5	18.6	46.1	69.5	88.3	230.0	626.5
Kapok for padding.	9.0	10.5	2.3	2.9	16.1	28.6	34.5	43.6	52.4	59.5	67.8	82.2
Tobacco leaf.....	1.2	2.5	2.1	2.5	4.4	8.1	61.0	106.8	92.7	20.2	24.1	14.5
Rubber.....	726.4	1,469.1	1,008.9	751.5	1,108.8	1,801.9	1,526.4	1,410.0	1,326.6	2,336.1	2,579.4	2,130.0
Total principal agricultural exports.....	2,598.0	3,531.9	3,852.9	4,795.1	4,798.8	5,488.2	5,100.6	5,805.4	5,172.7	5,963.4	6,812.5	8,045.2
Total, exports...	3,423.7	4,374.6	4,551.2	5,693.9	6,105.9	7,009.8	6,716.5	7,291.8	6,192.6	6,257.8	8,422.3	9,732.0

¹ Does not include rice flour. ² Excludes small quantities of salted eggs and eggs for hatching exported from provincial ports. (Source: Monthly Report of the Imports and Exports of Thailand, Dec. 1961) ³ Data not significant in a commercial sense. ⁴ Undressed cattle and buffalo hides.

Sources: 1950-60 data from Agricultural Statistics of Thailand, 1960, Ministry of Agriculture, Bangkok, Thailand; 1961 data from Bank of Thailand Monthly Report, Vol. 2 No. 8 Aug. 1962, except where otherwise indicated.

TABLE 6.--Thailand: Value of each agricultural export as percent of total exports 1950-61

Commodity	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Rice.....	48.9	41.7	57.8	65.9	53.9	45.9	42.9	49.9	48.3	35.9	30.8	¹ 37.4
Corn.....	.3	.5	.6	.8	.9	1.2	1.4	1.0	2.9	3.4	6.5	6.1
Cassava flour.....	.8	.3	.4	.6	.9	.8	1.4	1.7	2.9	2.7	3.2	4.4
Chili, dried.....	1.4	1.0	.5	.5	.8	.4	.5	.3	.2	.4	.4	.3
Mung beans.....	.3	.5	.4	.3	.4	.3	.6	.5	.4	.5	.6	.6
Peanuts.....	1.5	1.3	1.5	1.4	1.1	1.1	1.2	.7	1.0	.6	.5	.5
Castor beans.....	.3	.8	1.1	.9	.7	.5	.9	1.2	.7	1.1	.9	1.0
Fresh eggs.....	(²)	(²)	(²)	(²)	.2	.4	.9	.9	.7	1.0	1.5	³ 1.1
Buffalo and bullocks.....	(⁴)	(⁴)	(⁴)	(²)	.4	.6	1.1	.8	1.0	1.2	1.2	1.2
Hides and skins ⁵...	.9	.6	(⁴)	.4	.5	.8	.6	.6	.6	.9	.9	.8
Jute and kenaf.....	(²)	.1	.1	.1	.2	.1	.3	.6	1.1	1.2	2.7	6.4
Kapok.....	.3	.2	.1	.1	.3	.4	.5	.6	.8	.8	.8	.8
Tobacco leaf.....	(²)	.1	(²)	(²)	.1	.1	.9	1.5	1.5	.3	.3	.2
Rubber.....	21.2	33.6	22.2	13.2	18.2	25.7	22.7	19.3	21.4	32.2	30.6	21.9
Total principal agricultural exports.....	75.9	80.7	84.7	84.2	78.6	78.3	75.9	79.6	83.5	82.2	80.9	82.7
Total all exports	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

¹ Does not include rice flour.² Less than .05 percent.³ Excludes small quantities of salted eggs and eggs for hatching exported from provincial ports.⁴ Data not significant in a commercial sense.⁵ Undressed cattle and buffalo hides.

Source: Derived from table 5.

TABLE 7.--Thailand: Exports of rice; other agricultural and nonagricultural commodities expressed as percent of total exports, 1950-61

Commodity	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Rice.....	48.9	41.7	57.8	65.9	53.9	45.9	42.9	49.9	48.3	35.9	30.8	37.4
Other principal agricultural commodities....	27.0	39.0	26.9	18.3	24.7	32.4	33.0	29.7	35.2	46.3	50.1	45.3
Nonagricultural ¹ commodities....	24.1	19.3	15.3	15.8	21.4	21.7	24.1	20.4	16.5	17.8	19.1	17.3
Total.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

¹ Includes a few minor agricultural commodities.

TABLE 8.--Thailand: Value of exports, imports, and foreign exchange holdings, 1952-61

Item	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
	Million dollars	Million dollars	Million dollars	Million dollars	Million dollars	Million dollars	Million dollars	Million dollars	Million dollars	Million dollars
Exports (f.o.b.).....	329	323	283	335	334	365	309	358	408	475
Imports (c.i.f.).....	304	330	312	334	365	408	393	426	449	486
Gold and foreign exchange holdings ¹ .	348	304	279	301	315	321	306	308	360	443

¹ End-of-year figures.

Source: International Financial Statistics Vol. 15, No. 9 Sept. 1962.

VALUE OF RICE AND OTHER AGRICULTURAL EXPORTS

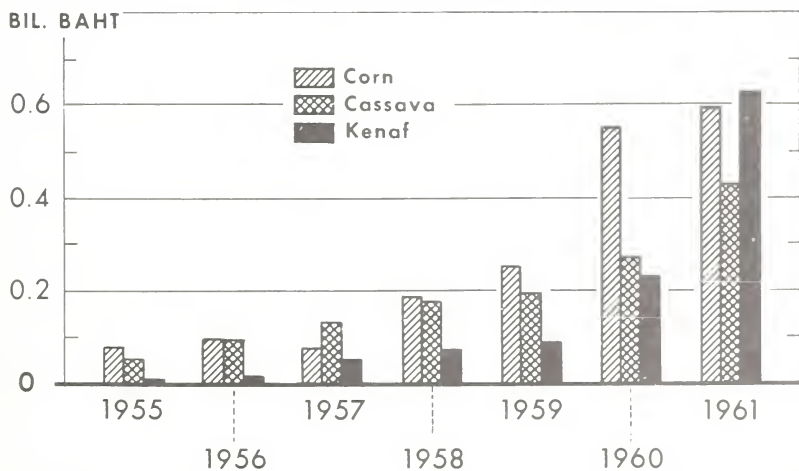


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Figure 2

FOREIGN EXCHANGE EARNINGS OF THREE NEW EXPORTS



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Figure 3

Unusually favorable world rice prices in 1961, combined with low rubber prices served to arrest the long-term downward trend in the rice share of total exports (fig. 4). The near record rice exports (both volume and value) also tended to obscure the striking gains in the other agricultural category.

Implications of Export Diversification

Trade is vitally important to agrarian countries such as Thailand, for it provides the key to rapid economic advancement. It makes possible the importation of modern technology in the form of capital goods and this is essential to the development of an advanced industrial society when the needed technology cannot be developed indigenously.

A more diverse agricultural export pattern has both expanded and stabilized Thailand's foreign exchange earnings (table 8). Export earnings have been stabilized in two ways: by exporting a greater number of commodities and by developing a broader range of markets. In addition to expanding exports to include a greater number of commodities such as rubber, cassava, corn, kenaf and eggs, it is particularly significant that two of these commodities cassava and eggs are foodstuffs; one important item, corn, is a feedgrain; and rubber and kenaf are industrial raw materials. This export diversification not only reduces the effect of fluctuating prices for a particular item but it goes further and reduces the impact of a recession in any one of the major industrial complexes such as North America, Japan, or Western Europe. Exporting a

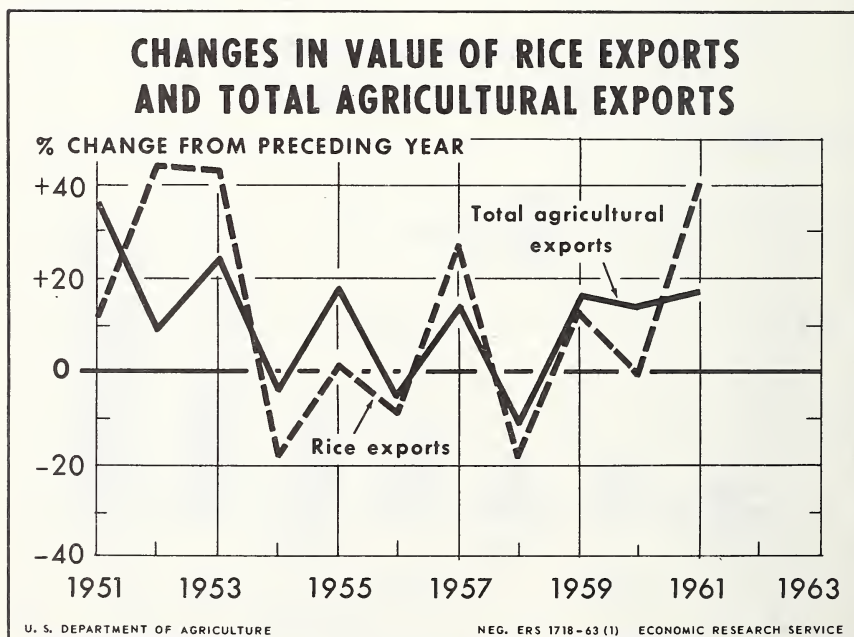


Figure 4

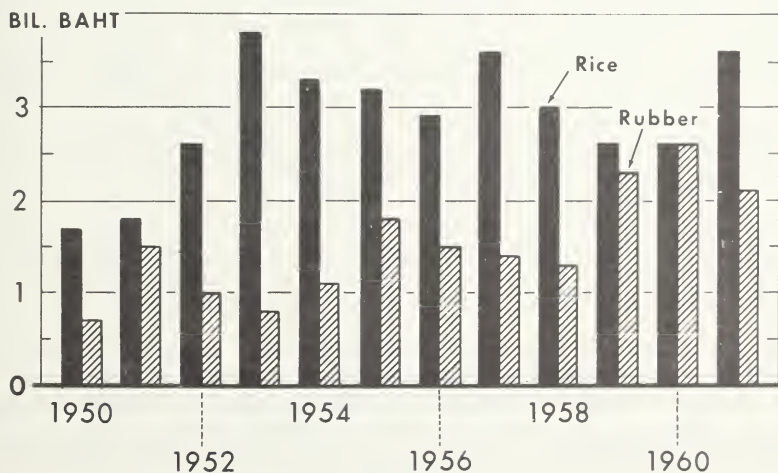
wider range of commodities reduces the undesirable effect of overdependence on one commodity with its associated wide price variations, and, at the same time, softens the impact of an economic downturn in any one of the major industrial complexes or countries.

Traditionally, most Thai rice has been destined for nearby rice-deficit countries such as Singapore, Malaya, Hong Kong, or Japan. Since rice earned most of the foreign exchange, any pronounced changes in demand in these countries had a strong impact on the balance-of-payments. By adding rubber, which was exported only to industrial countries, to the list, significant progress was made in stabilizing foreign exchange earnings. The rather extreme cyclical gyrations of either rice or rubber prices would cause serious problems in balancing payments with receipts but foreign exchange earning cycles of the two commodities have been strikingly complementary; when one is at a low ebb, the other is reaching a peak and conversely (fig. 5). Because of the wide variation in the value of exports of either rice or rubber it is indeed fortunate that Thailand has both commodities.

As corn, a feedgrain destined for end use in the agricultural sectors of Japan and Western Europe, was added, still another stabilizing force came into existence. Corn imports might be influenced by weather cycles in the industrial importing countries, whereas demand for rubber would more likely be affected by the longer-term business cycles.

Another, less obvious but nonetheless significant factor in the diversification of Thailand's agricultural exports is the greater flexibility in production planning with the new crops. Rubber has a

FOREIGN EXCHANGE EARNINGS OF THAILAND'S TWO LEADING EXPORTS



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Figure 5

production cycle of several years and rice land is so specialized that rice and other crops cannot always be easily interchanged; but new crops, such as corn and kenaf are annuals which have similar soil and climatic requirements, and can therefore be readily interchanged.

A response to prices, a factor often assumed lacking in under-developed agrarian economies, is very strong in Thailand and Thai farmers, given their new found versatility, will likely be quick to adjust to both temporary and long-term shifts in the world market.

Foreign exchange holdings which hovered close to \$200 million for several years, including most of 1959, began a strong upward trend in the last quarter of that year. Since then holdings have risen consistently as the following quarterly figures show: 1959--198, 201, 197, 204; 1960--214, 225, 236, 256; 1961--287, 300, 313, 339.¹²

Thailand in the International Economy

With the recent rapid expansion of agricultural exports, Thailand has emerged as the leading exporter of agricultural foodstuffs in Asia (fig. 6). Although the country has long been a leading rice exporter, it has just recently attained status as a leading supplier of corn in the world market. By 1961 it had easily surpassed both Rumania and Yugoslavia and moved into fourth place behind the United States, Argentina, and the Republic of South Africa.

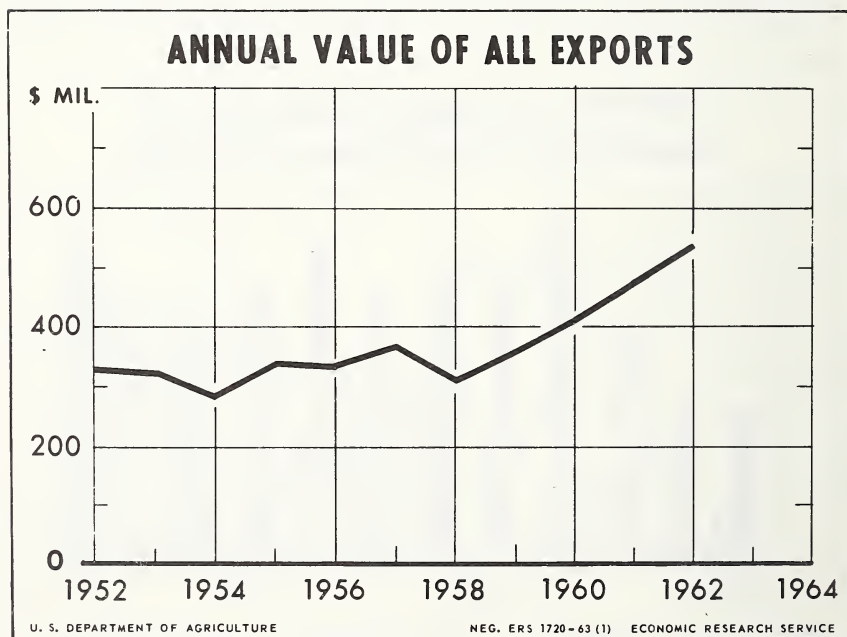


Figure 6

¹²International Financial Statistics, V. 15 (No. 9) Sept. 1962.

As Thailand's dependency on its traditional export, rice, has decreased, it has steadily added foreign markets for its new export crops. The addition of kenaf, for example, to the export list has expanded exports to Western Europe. Three Common Market countries--Belgium, Italy, and Germany--took nearly half of all kenaf shipments in 1961. Western Europe, also taking more of other commodities such as tapioca flour and meal, absorbed 18 percent of Thailand's exports in 1960 as compared with only ten percent in 1955. In contrast, the United States-Canadian share of total exports has declined over the last 3 years.

Japan, another leading market for Thai products, decreased its share of Thailand's exports from 18 percent in 1955 to seven percent in 1958 as it approached self-sufficiency in rice. This trend was reversed, however, with the rapid growth of corn imports needed to support the burgeoning livestock industry. By 1960 Japan was again taking 18 percent of Thailand's exports.

Hong Kong and Malaya, both heavily dependent upon Thai rice, accounted for an additional 23 percent of exports in 1960. Hong Kong's share has remained steady at about 9 percent over the 1955-60 period, but Malaya's share has declined from 25 to 14 percent as it has initiated plans to achieve self-sufficiency in rice.

MARKET RESPONSIVENESS AND SHIFTING PRICES

In many agricultural countries the response by farmers to favorable prices for their products is weakened by the nature of land tenure systems. This does not seem to be the case in Thailand, since most farmers are owner-operators and thus in a position to benefit from any favorable change in prices.

When desiring cash income Thai farmers frequently turn to new crops--crops which are new to them and which may be new to the economy as well. Just over a century ago farmers started producing rice on a large-scale commercial basis for the first time. Rice remained the only important cash crop until just after World War I when rubber was introduced into the country. During the middle 1950's, the commercial production of cassava and corn began to assume major proportions and by 1961 both were principal sources of cash. In 1959 another cash crop, kenaf, was added to the list of major cash crops; the phenomenal rate of growth in its output--a fourfold increase in two years--attests to the present degree of responsiveness of farmers to favorable prices. Rubber, corn, cassava, and kenaf, the four crops following rice in importance are produced almost entirely for the market; no rubber or kenaf and only small quantities of corn and cassava are retained by farmers.

Perhaps the most significant relative change in prices has been the decade-long gradual decline in the price of rice (fig. 7). This downward trend was arrested only temporarily in 1958 when adverse weather strengthened demand for a time. Once farmers began to become dissatisfied with the diminishing cash income from rice they began to consider alternative crops; this appears to be a key element in the "why" of agricultural diversification in Thailand.

After the Korean "boom", rubber prices dropped precipitously, but since then they have fluctuated rather widely without showing

WORLD PRICES OF RICE, RUBBER AND JUTE

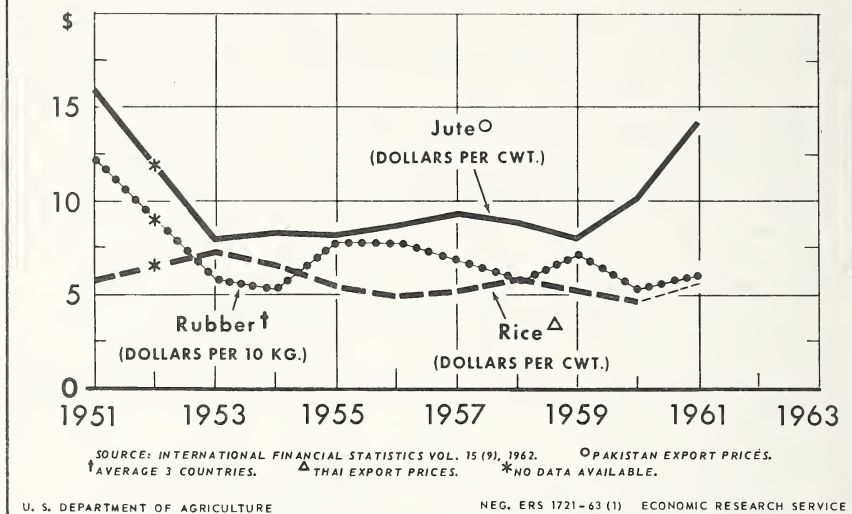


Figure 7

any clearcut trend. Jute prices also dropped after the Korean War, but they were quite stable from 1953 to 1959 and then rose sharply in 1960 and 1961.¹³ By 1959 Thai farmers were realizing their strongly competitive position in the world soft fiber market and the following successive price rises provided a strong incentive to raise output.

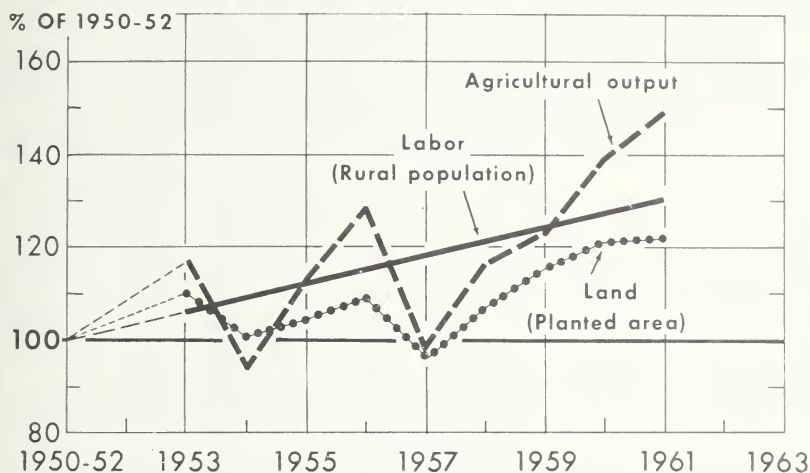
RESOURCE UTILIZATION: ADDITIONAL RESOURCES OR SHIFTING RESOURCES

Diversification may involve additions to the existing stock of resources, more intensive use of resources, or shifts in the use of resources from one crop to another. In Thailand both additional resources and more intensive use of existing resources have been involved in the diversifying process, but there is little evidence to indicate any significant shifts in resources from one crop to another.

Farm output, valued at 1952-54 world prices, expanded just over 50 percent from 1950 to 1961 but none of the inputs--land, labor, or capital--increased this much (fig. 8). The Thai population is estimated to have grown an average of 2-3 percent annually, or a total of 30 percent, during this period. Output increased an average of 2-3 percent per annum from 1950 to 1958, but from 1958 to 1961 it suddenly accelerated to 10 percent per year.

¹³ Since jute and kenaf are almost perfect substitutes, the more available jute prices are used.

AGRICULTURAL OUTPUT, PLANTED AREA, AND RURAL POPULATION



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Figure 8

Labor

Annual growth of the rural labor force was not appreciably greater in the 1958-61 period nor were other factors of production suddenly substituted for labor on a large scale. The difference in labor productivity traces to the introduction of new crops, with widely varying planting and harvesting dates, which resulted in a reduction of seasonal unemployment and a more effective use of the rural labor force; this was particularly true where the new crops permitted farmers to double crop. This gain in output per farm worker seems to have occurred largely because of the increase in days worked rather than because of greater output per day.

Land

During the 11-year period under survey the planted area expanded 25 percent. Most of this increase is attributable to new land brought under cultivation but some of it is due to more double cropping. The wider selections of crops has been conducive to double cropping; upland crops, such as corn and mungbeans can be rotated within a 1-year cycle or they can be grown on paddy land during the dry season. A regional analysis of land utilization comparing area planted in each crop in 1950 and 1959 shows that the planted area of virtually every significant crop increased in each of the four regions (table 9). Planted area was increased to make room for the new crops in every case; land was not shifted from the production of traditional crops.

TABLE 9.--Thailand: Acreage distribution of principal crops by region, 1950 and 1959

[Region]

Commodity	Northern		Northeastern		Central Plain		Southern	
	1950	1959	1950	1959	1950	1959	1950	1959
	<u>1,000</u> <u>acres</u>	<u>1,000</u> <u>acres</u>	<u>1,000</u> <u>acres</u>	<u>1,000</u> <u>acres</u>	<u>1,000</u> <u>acres</u>	<u>1,000</u> <u>acres</u>	<u>1,000</u> <u>acres</u>	<u>1,000</u> <u>acres</u>
Rice.....	908	999	5,015	6,073	6,614	6,682	1,140	1,213
Corn.....	9	26	32	174	40	258	8	35
Cassava.....	(¹)	(¹)	(¹)	(¹)	2 33	154	(¹)	(¹)
Sugarcane.....	14	36	32	109	82	204	5	16
Mung beans.....	1	2	9	20	90	91	1	(¹)
Castor beans.....	1	2	2	20	8	47	(¹)	(¹)
Peanuts.....	39	35	33	71	92	134	8	7
Soybeans.....	20	21	1	3	28	30	(¹)	(¹)
Coconuts.....	2	3	5	35	45	116	145	180
Sesame.....	1	1	6	18	39	34	(¹)	(¹)
Cotton.....	11	6	54	64	25	49	(¹)	(¹)
Kenaf.....	(¹)	(¹)	12	108	(¹)	2	(¹)	(¹)
Tobacco.....	25	67	22	56	25	28	(¹)	(¹)
Rubber.....	(¹)	(¹)	(¹)	(¹)	(¹)	(¹)	780	1,004
Total.....	1,031	1,198	5,223	6,751	7,121	7,829	2,087	2,455
Index (1950 = 100).	100	116	100	129	100	110	100	118

¹ Production not significant in this region.

² Production for 1950 is Choburi province only, but 1959 also includes newer areas of production in the Central Plain region.

Source: Agricultural Statistics of Thailand, Ministry of Agriculture, Bangkok, Thailand.

Additions to the planted area were relatively more important in the three outlying regions than in the traditionally more accessible central region. This reflected the national policy of developing stronger transport links between the more distant sections and Bangkok, the chief port and capital.

Agricultural output, expanded about twice as much as planted area from 1950-52 to 1961, reflecting rising yields. Yields of two crops, corn and sugarcane, nearly doubled during this 10-year period. Two other key crops, tobacco and rubber, gained about a third over the same period. Improvements in rice yields, amounting to only 10 percent, were more modest.

Capital

Statistics on capital inputs are even less complete than on land or labor, but available evidence indicates a general rise in capital

inputs as cultivated area expands, and possibly even a slight rise in capital inputs per acre under cultivation and per worker between 1950 and 1961. Investment in irrigation facilities expanded the irrigated area from 2 million acres in 1950 to nearly 4 million in 1961. This is perhaps one of the most significant expansions of capital inputs and it accounted for a significant portion of the overall growth in farm output. Seed, the traditional capital input, probably increased commensurately with acreage planted, although realizing considerable improvements in quality. Chemical fertilizers and insecticides are not yet produced domestically and are not used extensively, but import data show that the use of both has increased over the past few years.

In summary, it seems that the pattern of inputs--land, labor, and capital--has changed little; all have increased substantially but not as much as output. It is very likely that a positive interaction of factors is involved, i.e., the total effect of several improvements made simultaneously is greater than the sum of the effect of each considered separately.

FACTORS FACILITATING AGRICULTURAL DIVERSIFICATION

Government Policy

There is no direct government limitation of agricultural production with the exception of tobacco, which is regulated by the Thailand Tobacco Monopoly. Although there are no direct subsidies to production, export duty concessions and free irrigation water and insecticides might be considered as such. The government does provide support prices for selected agricultural products such as corn and kenaf. In practice, however, support measures for these two crops have rarely, if ever, been needed and so have had little direct influence on production.

Government policy has been instrumental in expanding tobacco production. The tripling of tobacco production during the past decade is due largely to the operation of the government sponsored Tobacco Monopoly. This organization, given the exclusive right to control the import, production, and distribution of all tobacco and tobacco products, has provided some strong incentives to producers of Virginia-type tobacco. In addition to providing skilled field men to advise on production practices and problems, the Monopoly provides selected seeds and seedlings at reasonable prices and fertilizer at cost.

Not all government policies designed to encourage diversification are successful. Despite promotional efforts and varietal and fertilizer tests on cotton to improve yields, production has not risen appreciably. A deficit in raw cotton has existed for some time and imports have been increased to meet the needs of the expanding cotton textile industry.

The government has not encouraged farmers to expand rice output. In fact its procedure of raising some 70 percent of its total revenue by acting as the intermediary between domestic rice millers and overseas markets has undoubtedly limited the expansion of rice output.¹⁴ This, combined with its active encouragement of many other crops, has greatly assisted the diversification process.

¹⁴ See p. 248 of reference cited in footnote 2.

Since World War II the Thai government has been developing a growing appreciation of the need for agricultural diversification as a means to economic growth and expansion. As this awareness has grown in government circles the institutional means for achieving a more diversified economy have gradually developed. Thailand's 6-year development plan, initiated in 1961, has as its main theme the diversification of agriculture. Basic requirements for aiding diversification are the creation of more power for industry and agriculture, irrigation for crops other than rice, and the expansion of transportation and communications systems to link outlying areas more closely with the capital and port city of Bangkok.

The present policy of encouraging foreign investment may do much to support the development and diversification of agriculture for much linkage (see later discussion on linkage p. 29), both backward and forward, will be needed. As Thai agriculture becomes more capital-intensive and commercially oriented, capital goods such as fertilizer, machinery, improved seeds, and insecticides are certain to be used in growing quantities. Thus far it has been possible to increase output by merely expanding the cultivated area. But soon this will no longer be practical and more capital inputs per acre will be the alternative. Also, as market-oriented output grows, more packaging, transport, and processing will be required.

Transport Facilities

The improvement and extension of transport facilities--rail, highway, and water--during the past decade has served to connect Bangkok with the further reaches of the country. As a result previously subsistence-oriented areas have been linked with the world market. Transport development has expanded the scope of the market for the village producer, and made both consumption goods and agricultural production goods available.

Due to the role of transport development in promoting agricultural expansion new land brought under cultivation has been rather well distributed and not limited to the Bangkok area.

Under the recently inaugurated 6-year development plan, the State's Railway, the Highways Department, and a government-owned road transport organization are all working on major expansion schemes. When the large Yan Hee and Chao Phraya irrigation projects are completed, some 250 miles of strategically located navigable waterways will be added to the existing system. Transport developments recently completed or now underway are purposely designed to facilitate the utilization of unrealized resource potential, particularly in the field of agriculture.

Irrigation Works

The introduction or expansion of irrigation often serves to broaden the range of climatic conditions of a given country or region and hence the selection of crops which can be produced. In Thailand irrigation projects are permitting an extension of the area under rice cultivation and also the cultivation of upland crops

in moisture-marginal areas. Irrigation should improve both yields and quality and in so doing result in more effective use of land, labor, and other capital inputs.

Under the recently inaugurated 6-year development plan the irrigated acreage is scheduled to expand from 3.6 million acres to 4.8 million acres. The greater part of this irrigated land is for crops other than rice. In addition to providing much needed water, irrigation works situated at strategic sites also reduce the incidence and extent of destructive floods, which often cause serious damage to crops, particularly rice.

External Assistance

External assistance received by Thai farmers during the past decade has come principally from the United States Government and the Food and Agricultural Organization of the United Nations.

The FAO mission has contributed to diversification by emphasizing development of upland crops. This effort involved three phases: Selecting the most suitable varieties, developing and recommending improved cultural practices, and producing and distributing superior seeds.

From 1951 to 1960 the United States directly invested \$12 million in agricultural assistance to Thailand. Irrigation and water conservation accounted for 3.8 million or nearly a third of this total. Much of the effort to irrigate land was directed toward the irrigation of upland crops. The three next most important areas of investment were crop improvement, agricultural extension, and agricultural credit and marketing, each absorbing 1.2 million dollars. Rice improvement, a project separate from crop improvement, was allotted less than 0.3 million dollars, thus indicating a relative decline in emphasis on this traditional crop.

Perhaps the most important single factor in the crop improvement program was the introduction of an open pollinated flint variety of corn from Guatemala. This variety, quite superior in performance and yield to previously used indigenous varieties, has been instrumental in doubling yields and raising output several fold.

In addition to U.S. and FAO assistance efforts, Japan has contributed to the diversification effort by providing technical specialists to assist Thai farmers and exporters with handling and storage of corn. Particular efforts have been made to reduce the high moisture content considered so undesirable by Japanese feed grain importers.

Other Factors

Shifts in the relative prices of farm products, government agricultural policy, expansion of the transportation and irrigation systems, and external assistance, have facilitated the diversification of agriculture. Other contributing factors are:

1. Land is plentiful; aggregate output can be raised by simply bringing more land under cultivation. (Most Asian countries can substantially increase output only by raising yields--a method which usually requires scarce capital.)

2. Thailand has always had an equitable land distribution pattern and has hence avoided the usual land reform with its subsequent, sometimes lengthy, readjustment period.
3. Political instability has been minimal.
4. A developing agricultural extension service has helped get information and ideas to farmers.
5. The desire to emulate more advanced societies, quite noticeable in rural areas, is a strategic source of motivation.
6. World trade has expanded 53 percent, on a value basis, during the 1951-61 period, providing an environment favorable for developing an export-based diversification of agriculture.¹⁵
7. Japan, a major trading partner, has tripled its total trade and although it no longer imports Thai rice, it has begun to develop a sizeable commercial livestock industry based on imported feed grains, mostly corn--a commodity which Thai farmers can easily supply at competitive prices.

THE IMPLICATIONS OF AGRICULTURAL DIVERSIFICATION

Development of an Exchange Economy

The development of an exchange or money economy has been closely linked to the development of the export sector. It was not until the Bowring Treaty of 1855 which established trade relations between Thailand and Great Britain that both exports and imports began to expand appreciably. Prior to this time money incomes were for the most part nonexistent and the exchange of goods, even on a barter basis, was limited. The lure of foreign goods such as bright cotton prints from the mills of Lancashire provided a strong incentive to produce rice for cash--for export. It was this exposure to the world market that provided the initial impetus for the development of an exchange economy.

The transition from a barter, subsistence economy to a money economy has been uneven with respect to both time and region. When periods of large domestic surplus have coincided with favorable world market prices, the money sector has developed rapidly, but at other times when crops have been poor and prices unfavorable it has stagnated or even regressed. In general those areas with better access to the world market have developed most rapidly. Some years, when world rice prices have been particularly attractive, it has been necessary for the government to restrict or ban exports in order to prevent overexporting and subsequent domestic food shortages.

Diversification may occur in a subsistence economy; its purpose may be simply a greater variety in items produced for domestic consumption. But this would seem to represent the exception rather than the rule. During the period under study in Thailand, diversification has occurred as producers have responded to the varied needs of the world market as well as traditional domestic requirements. The resulting higher income combined

¹⁵ International Monetary Fund. International Financial Statistics. April 1961 (Calculations based on exports only).

with an exchange economy may then permit a more diversified consumption pattern.

Level and Stability of Farm Income

Farm income may be considered either in terms of the farm sector as a whole or of individual farmers. The level of income calculated at constant prices has risen an average of 10 percent annually for the past 6 years--years during which new crops have been gaining wide acceptance (table 10, fig. 9). Although data are not available for individual farms, the great majority of farmers have shared in this rise in income. The production of the newer cash crops, especially corn, has been widespread in terms of the number of producers. Few farmers specialize in these new crops and in the main they are supplementary cash crops grown along with rice, the staple crop.

Income changes associated with diversification may vary considerably depending on whether the resources used represent previously unused resources or simply the transfer of resources from other uses. Incomes may rise rapidly when previously unused resources are used to raise output. A large part of the production increment in Thailand has resulted from using previously uncultivated land and seasonally unemployed labor.

In regard to stability, it is likely that both the farm sector and the individual farmer are less susceptible to price fluctuations and weather conditions. For example, world prices for rice and rubber, the two leading exports, have followed almost exactly complementary cycles thus neutralizing the effect of extreme price variations. Weather unfavorable to rice may be favorable for corn or kenaf, and for prices the same is true. As the number of commodities produced increases, agricultural income tends to become more stable.

New Attitudes and New Skills

The acquisition of new attitudes and the development of new skills are basic to economic change and progress. Some hold that the susceptibility of a population to change and its potential rate

TABLE 10.--Thailand: Gross farm income and index of farm income, 1954-60¹

Item	Unit	1954	1955	1956	1957	1958	1959	1960
Gross income ² ...	Million baht	10,596	11,524	12,098	11,722	11,496	13,661	17,014
Index (1954=100)	Percent	100.0	108.8	114.2	110.6	108.5	128.9	160.6

¹ Farm income figures not available prior to 1954.

² Adjusted to constant prices by deflating with index of wholesale prices (1953 = 100).

Source: Agricultural Statistics of Thailand, Ministry of Agriculture, Bangkok.

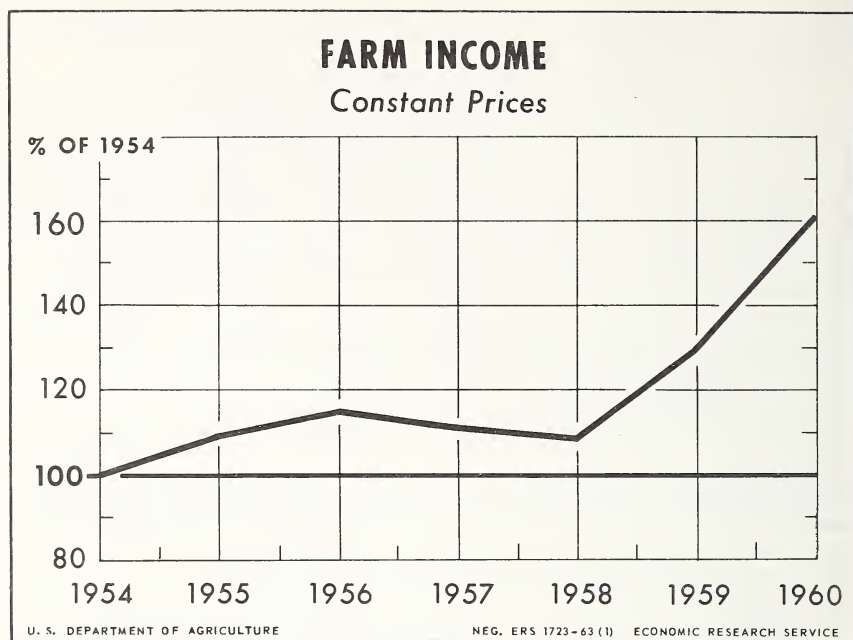


Figure 9

of growth are very closely correlated. This may well be, for specialization in subsistence crops does seem easier than diversification; fewer new skills are needed and the disruption of traditional behavior patterns is kept to a minimum.

Kaufman, whose study is based on his stay in the Thai village of Banghwad in 1953-54, records the following contrasting characteristics between the traditional, subsistence-oriented village and the market-oriented village.¹⁶

<u>Old Rice Economy</u>	vs	<u>New Rice Economy</u>
simple subsistence, non-competitive		complex, competitive - export
broadcast sowing		transplanting
individual household-unit labor		multi-household unit labor
barter		cash
non-mechanized irrigation		mechanized irrigation
extended family cohesion		nuclear family, extended-disjointed
sedentary social activities		migratory extra-village social activities
wat-oriented education ¹⁷		national oriented education
strong dependence on wat		declining importance of wat
village, farming-oriented future		non-farming, urban salaried future

If Kaufman were to have observed a Thai community in 1961-62 rather than in 1953-54 he might have recorded even more pronounced changes in the socio-economic character of the local communities.

¹⁶ Kaufman, H. K. *Bangkhwad, A Community Study in Thailand*. P. 210, Association for Asian Studies, N. Y., 1960.

¹⁷ The wat is the village level Buddhist church.

The successful introduction of the new cash crops into the rural sector in a relatively short period of time has created an awareness and appreciation of economic opportunity. The apparent quickness with which these opportunities have been grasped by a large number of small farmers is possibly the most encouraging aspect of the diversification phenomenon.

Linkage Effects: Forward and Backward

The term "linkage effects" refers to economic expansion in a given industry resulting from the development of another industry. Forward linkage refers to the economic stages between the given industry and the end consumer; backward linkage to those economic stages between the industry in question and the basic product.

"The lack of inter-dependence and linkage is of course one of the most typical characteristics of under-developed countries.... Agriculture in general, and subsistence agriculture in particular, are of course characterized by the scarcity of linkage effects. By definition, all primary production should exclude any substantial degree of backward linkage although the introduction of modern methods does bring with it considerable outside purchases of feed, fertilizers, insecticides, and other current inputs, not to speak of machines and vehicles."¹⁸

This quotation from Hirschman provides an appropriate introduction to a discussion of backward and forward linkage. The available empirical evidence on recent investment projects in Thailand bears out Hirschman's contention that agriculture, like most primary enterprises, is characterized by more forward linkage than backward linkage. A limited survey of recent investment projects shows that those representing forward linkage greatly outnumber those qualifying as backward linkage.

Investment in projects in the forward linkage category has picked up markedly in the last few years. The following are typical of the numerous plants now under construction or already in operation; a rice bran oil factory which will extract vegetable oil from bran; a corn flour plant producing 60 million pounds of corn flour annually for export; a modern tapioca flour mill producing 40,000 pounds daily for export; and a sugar refinery representing a 3.5 million dollar investment.¹⁹

Much foreign capital, as opposed to domestic capital, is being invested in backward linkage projects, possibly because of the more complex technology involved. A Japanese firm is constructing an insecticide plant and West Germany is providing investment credit and technical assistance for a fertilizer plant costing several million dollars. Liberal investment regulations in the area of taxes and profit repatriation have been instrumental in increasing the inflow of foreign capital.

Occasionally a single investment, such as a recent multimillion dollar investment in a gunny bag factory near Bangkok, may represent both backward and forward linkage. This plant uses a raw material from the farm sector (kenaf) and sells its product (gunny bags) to farmers for use in hauling and storing rice, corn, and

¹⁸ Hirschman, A.O. *The Strategy of Economic Development*, p. 109, New Haven Yale Press, 1958.

¹⁹ Unclassified embassy economic reports. American Embassy, Bangkok, Thailand, 1961.

other commodities. In the past, Thai farmers have been heavily dependent on foreign sources for their supply of bags.

The rapid development of commercialized agriculture, particularly in the last 3 years, has provided a strong stimulus for the development of light industry. Exact figures on aggregate investment in agriculture-related industries are not available but the inducement to invest is strong and, when coupled with a liberal government policy towards investment, it has done much to activate domestic capital and bring in private foreign capital.

Structural Change

As agricultural production for the market, especially that part destined for export, expands relative to subsistence production, structural change occurs. Since the amount of transportation, marketing, and agricultural processing required for market-oriented production is so much greater than for subsistence agriculture, the contribution of these sectors to the national product will expand relative to that of agriculture (table 11). As agriculture becomes more commercialized and capital intensive, a sizable segment of industry will develop to supply fertilizer, pesticides, implements, and other capital inputs.

Data on the component parts of the gross domestic product from 1951 to 1960 show that the agricultural share has declined from 55 to 36 percent over the 9-year period. This has occurred despite rapid growth in the agricultural sector. Those sectors which directly service agriculture--transportation, storage, communication, and wholesale and retail trade--have made impressive gains both absolutely and in terms of their sectoral shares of the gross domestic product.

TABLE 11.--Thailand: Sectoral shares of gross domestic product in selected years

Sector	1951	1954	1957	1960
	<u>Per- cent</u>	<u>Per- cent</u>	<u>Per- cent</u>	<u>Per- cent</u>
Agriculture, forestry, fishing, and hunting ¹	55.3	40.2	38.0	36.0
Mining and quarrying.....	1.9	1.7	1.6	1.6
Manufacturing.....	11.5	13.1	13.5	14.5
Construction.....	1.7	3.1	4.4	3.9
Electricity, gas, and water.....	.1	.2	.2	.2
Transportation, storage, and communication	3.2	5.6	5.8	7.0
Wholesale and retail trade.....	13.6	18.7	19.7	20.1
Banking, insurance, and real estate.....	} 3.4	4.7	4.6	4.9
Ownership of dwellings.....		5.0	5.7	5.4
Public administration and defense.....		7.7	6.5	6.2
Services.....	9.3			
Gross domestic product at market price..	100.0	100.0	100.0	100.0

¹Forestry, fishing, and hunting make up only a very small fraction of this grouping.

Source: United Nations Yearbook of National Accounts Statistics, 1961.

CONCLUSIONS

The price of diversification for diversification's sake alone can be quite high. If diversification represents the shifting of resources from the production of a crop or crops in which a strong natural advantage is enjoyed to those in which little or no natural advantage exists, it may be a costly process. But if it occurs as a result of more efficient use of the existing stock of resources, it may represent impressive gains in both the level of economic activity and the expansion and stabilization of export earnings. Most of the diversification which has occurred in Thailand seems to be of the latter kind; rice production and exports have continued at the same or a slightly higher level, and the new crops simply represent additions to existing production and exports.

Following are the specific conclusions derived from this study:

1. Agricultural diversification has greatly stimulated the rate of growth of aggregate agricultural output.
2. Diversification of agriculture represents a response by farmers, possessing unutilized resources, to the demand of the world market. Stated otherwise, the more varied output of the farm sector has resulted from the integration of a largely subsistence agrarian economy into the world economy.
3. The present responsiveness of farmers to marketing opportunities seems to be the culmination of a long-term development which began about a century ago when large-scale rice production for export began.
4. Shifting prices of farm products have played a leading role in diversification. Outstanding among the shifts in the price structure has been the long-term gradual decline in rice prices relative to other prices.
5. Widespread participation in the production of commercial crops for export has created a broad market among the rural population for both consumer goods and production goods in the form of fertilizer, implements, improved seed, and pesticides.
6. Agricultural diversification and the associated rapid rise in aggregate farm output, particularly over the last 3 years, seems to be largely attributable to the utilization of previously uncultivated land and seasonally unemployed labor.
7. Shifts in the agricultural export pattern have been greater than those in the agricultural production pattern, since nearly all of the change in production has been export-oriented.
8. By diversifying and developing a more flexible economic structure, Thailand has reduced its susceptibility to declining terms of trade and improved its capacity to benefit from improving terms of trade, for it can now shift the emphasis

from one export to another or even from one import substitute to another. Perhaps most important of all, Thailand's export potential and hence economic expansion is no longer limited by world demand for one or, at best, a few specialized products.

9. Linkage effects of the larger more diversified output, especially forward linkage, have done much to raise the level of economic activity throughout the economy.
10. Diversification in the rural sector and the subsequent development of a broad-based exchange economy accompanied by enlightened government policy concerning foreign investment have done much to encourage the influx of foreign private capital and its accompanying complement of managerial and technical skills.
11. The stimulus for diversification has come largely from the external market and it has affected not export enclaves or plantation producers, for they are curiously lacking, but the great bulk of the small scale owner-operators who comprise the agricultural sector of the Thai economy. That Thai farmers have begun to make cost and profit calculations, respond to prices, and to direct their production toward the market as well as to their own needs is one of the most encouraging developments on the economic scene. This, coupled with the relative abundance of land and generally favorable agricultural resources augurs well for Thailand's economic future as it is further integrated into the world economy.

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